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Ahroni

[11] **4,309,068**

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[54] **FUSED PLUG ASSEMBLY WITH SPARE FUSE ELEMENTS**

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[51] **Int. Cl.**[3] **H01R 13/68**

[52] **U.S. Cl.** ..... **339/147 P;** 337/198; 337/297

[58] **Field of Search** ..... 339/147, 195, 196, 206 P, 339/157 C; 337/197, 198, 297, 194, 211, 212, 220, 257, 293, 295

[56] **References Cited**

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Primary Examiner—John McQuade
Attorney, Agent, or Firm—Seed, Berry, Vernon & Baynham

[57] **ABSTRACT**

A fused electrical plug assembly is provided having a plug body with a fuse socket between projecting prongs, and a push-in fuse unit is received in the fuse socket. The fuse unit has an exposed enlarged head for gripping to remove the unit and has one opposite pair of active fuse elements between which there is a spare pair which can be used by removing the fuse unit, turning it ninety degrees, and pushing it back into the fuse socket.

8 Claims, 8 Drawing Figures

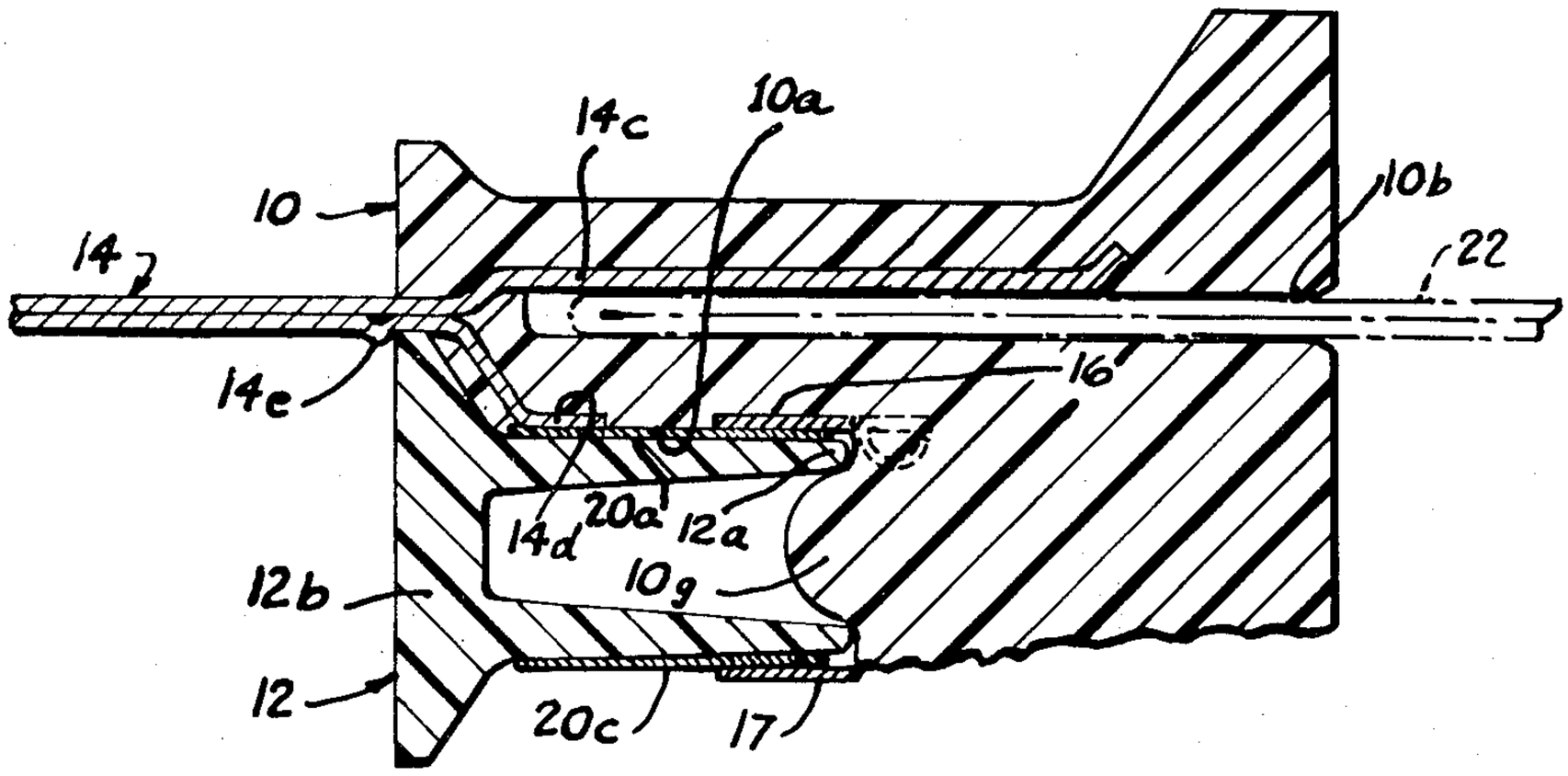


FIG. 1

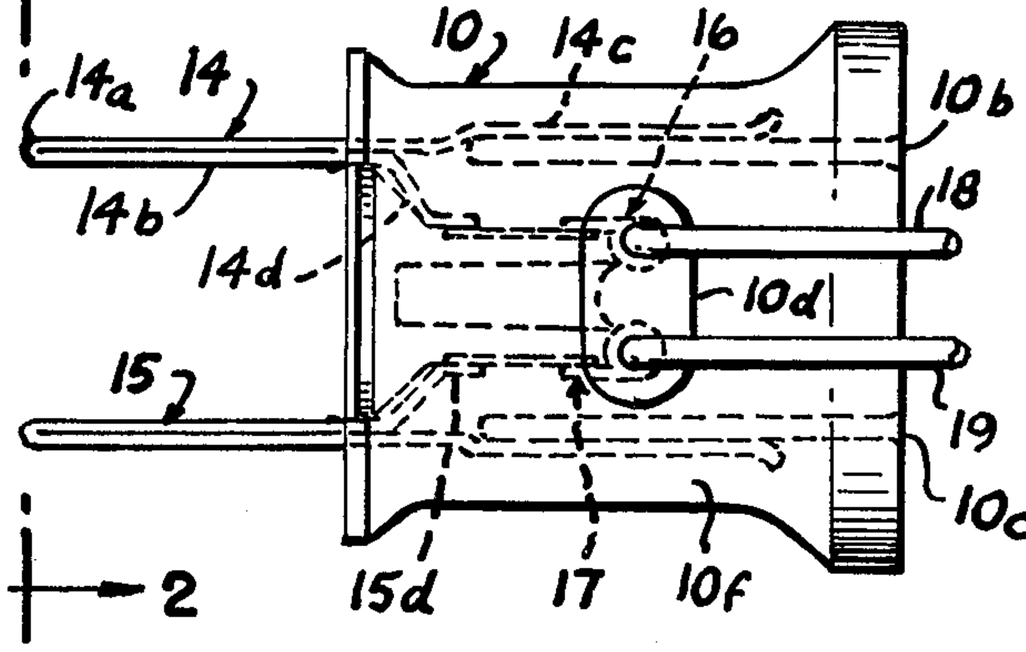


FIG. 2

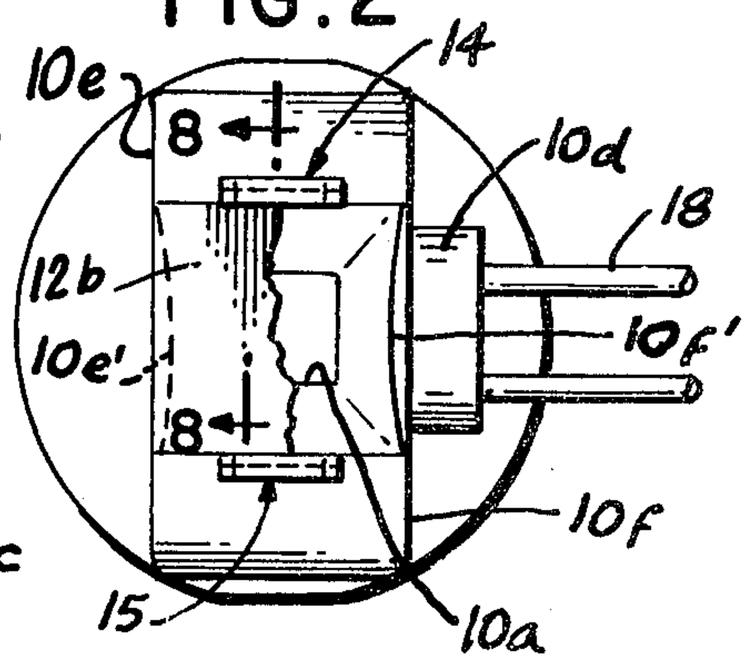


FIG. 3

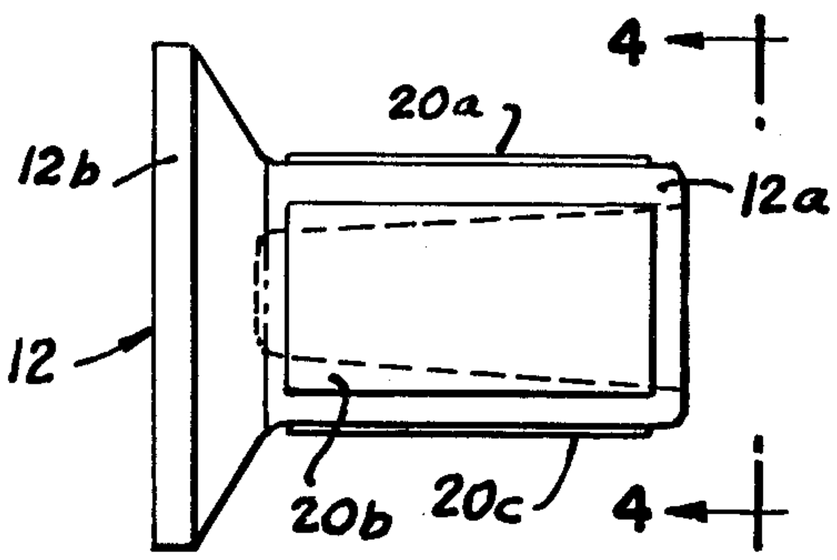


FIG. 4

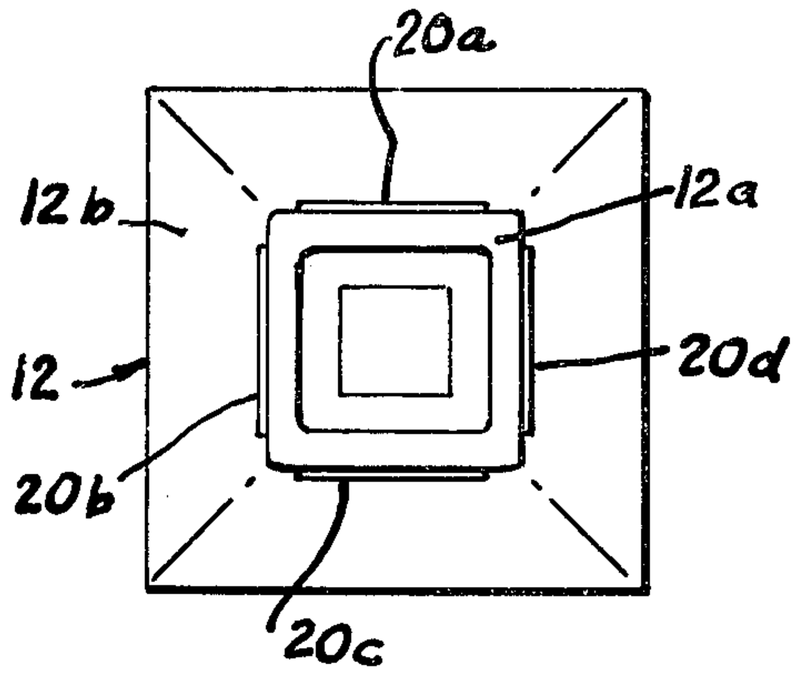


FIG. 5

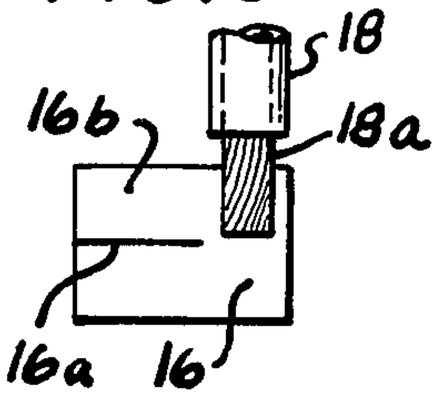


FIG. 6

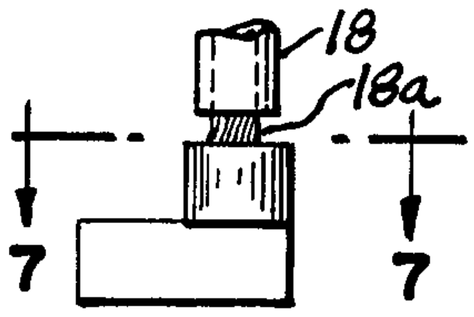


FIG. 7

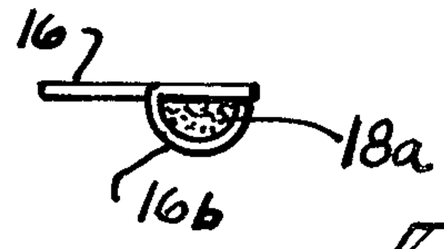
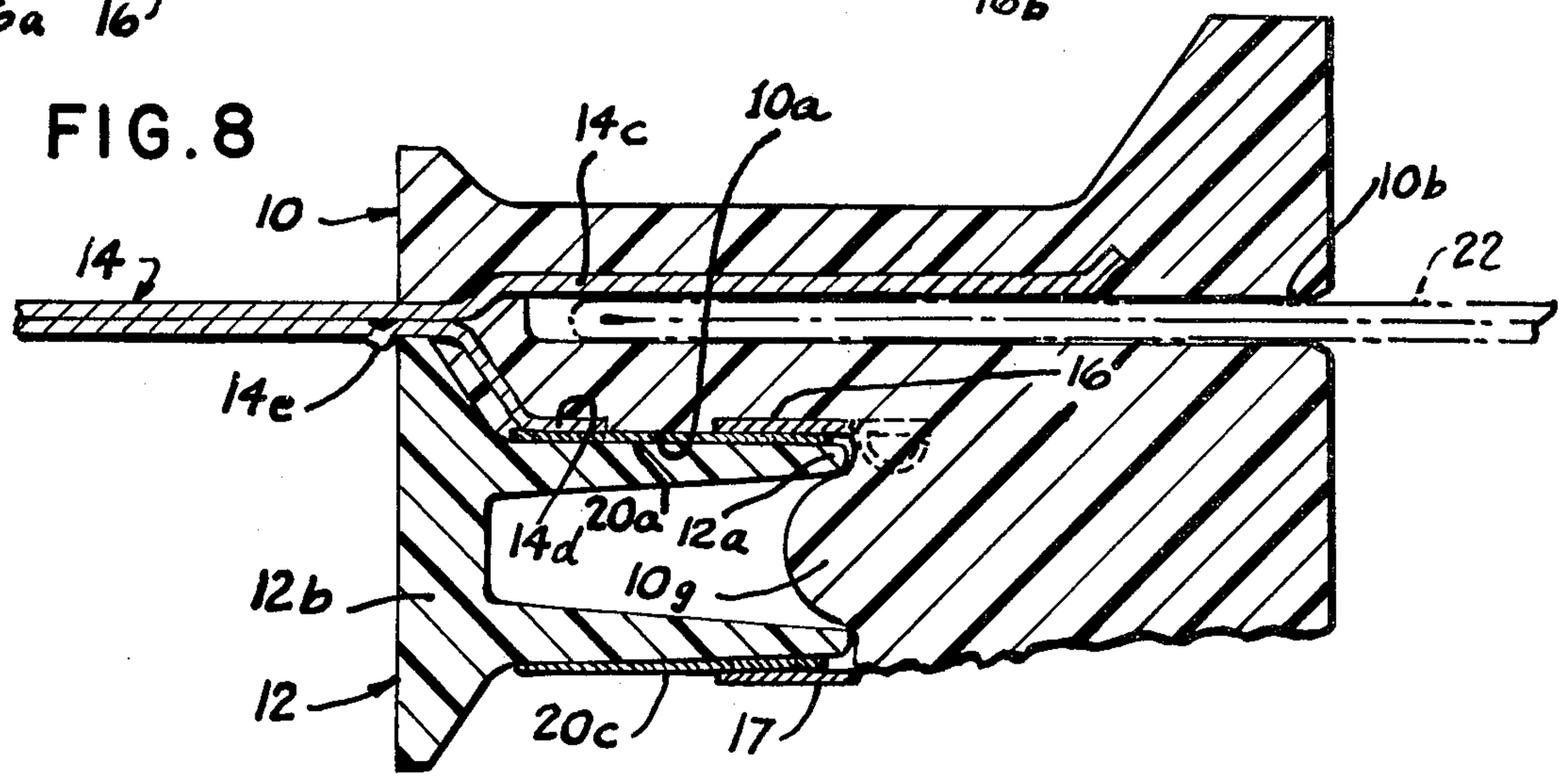


FIG. 8



FUSED PLUG ASSEMBLY WITH SPARE FUSE ELEMENTS

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to fused electrical plugs and particularly to those for use with Christmas tree light sets and other decorative light sets.

2. Description of the Prior Art

Electrical plugs having internal fuses for opening an electrical circuit responsive to excess current flow are in use on decorative light sets. Typical designs are shown in U.S. Pat. Nos. 3,976,967; 4,080,039 and 4,178,061.

Need has arisen for a safe, reliable, cheaper and simpler plug unit having a minimum of parts and in which a fuse is easy to change. There is also a need for a plug unit providing its own spare fuse. The present invention aims to meet these needs.

SUMMARY OF THE INVENTION

In accordance with the present invention the use of fuse carriers and fuse access covers has been eliminated by providing a push-in fuse unit having an enlarged head located between the prongs and which can be gripped for removal. The fuse unit is preferably square in cross-section and has an active pair and a spare pair of fuse elements along its four sides, the active pair engaging two sets of contacts provided by the prong members and the wire leads at opposite sides of a socket receiving the fuse unit. The spares can be put into use by removing the fuse unit from the socket and reinserting it after turning it ninety degrees.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a side elevational view of a fused plug assembly embodying the present invention;

FIG. **2** is a front plan view of the plug assembly with part of the head of the fuse unit broken away and taken as indicated by line **2—2** of FIG. **1**;

FIG. **3** is an enlarged side elevation view of the fuse unit;

FIG. **4** is a rear plan view of the fuse unit taken as indicated by line **4—4** of FIG. **3**;

FIG. **5** is a side elevational view of a contact element blank to an enlarged scale;

FIG. **6** is a side elevational view of the contact element when attached to a wire lead;

FIG. **7** is taken as indicated in line **7—7** of FIG. **6**; and

FIG. **8** is an enlarged fragmentary longitudinal sectional view taken as indicated by line **8—8** in FIG. **2**.

DETAILED DESCRIPTION OF THE INVENTION

Referring to the drawings it is seen that the fused plug assembly of the present invention comprises a plug body **10**, a push-in fuse unit **12**, a pair of prong members **14–15**, and a pair of wire contacts **16–17** connected to a pair of leads **18–19**. The plug body **10** is formed with a central square fuse receiving socket **10***a* at the front and a pair of standard prong sockets **10***b*, **10***c* at the rear.

The fuse unit **12** has a hollow body **12***a* preferably generally square in transverse cross-section and formed with an enlarged head **12***b*. Two pairs of fuse element strips **20***a–d* extend along the four outer faces of the fuse body **12***a*, one opposite pair **12***a*, **12***c* of these strips electrically interconnecting the prong members **14–15**

with the wire contacts **16–17** while the other pair **12***b*, **12***d* remain as spares.

The prong members **14–15** are alike, but positioned with opposite orientation; hence, only prong member **14** will be described in detail. It is formed by doubling back the brass prong stock from the projecting tip **14***a* to form an exposed prong **14***b* of double thickness for insertion into a wall socket or other plug. Within the plug body the prong member has two separated legs, one leg **14***c* being outwardly offset to extend along the outer side of the prong socket **10***b* to engage the respective prong **22** of an add-on plug when plugged into the plug body **10**. The other leg is bent inwardly and then rearwardly to provide a contact portion **14***d* exposed to the fuse socket **10***a* near the mouth thereof. This contact portion **14***d* is opposed by a contact portion **15***d* on the opposite side of the fuse socket. The contacts **16–17** are alined with and spaced rearwardly from the contact portions **14***d*, **15***d* so that the fuse elements **20***a*, **20***c* will engage and electrically interconnect the contacts **16–17** with the contact portions **14***d*, **15***d* of the prong members.

As indicated in FIGS. **5–7**, contact **16**, for example, is formed by slitting a rectangular brass blank at **16***a* to form an arm **16***b* which is crimped over the exposed terminal wire portion **18***a* of lead insulated wire lead **18**. The leads **18–19** extend from the contacts **16–17** out the sides of the plug body through a boss portion **10***d* to connect with the sockets of the first and last light in a string of lights.

It will be noted that the front portion of the plug body **10** between the prongs **14–15** is recessed and tapered to the mouth of the fuse socket **10***a* to match the enlarged head **12***b* of the fuse unit. The width of the front part of the plug body **10** is given the same dimension as the standard distance between the prongs **14–15** so that the square head **12***b* will extend on two of its side edges to the sides **10***e*, **10***f* of the plug body while its other two side edges extend into frictional engagement with the opposing inner faces of the prongs **14–15**. This frictional engagement together with a relatively snug fit of the fuse body **12** in the fuse cavity **10***a* keeps the fuse unit **12** in pushed-in position relative to the plug body **10**. If desired, one or both of the prong members **14–15** can be dimpled inwardly adjacent the top face of the fuse body to provide a small locking knob **14***e* (FIG. **8**). The fuse body is molded from a sufficiently resilient plastic as to permit the enlarged head **12***b* to pass the knob **14***e* when the fuse unit is pushed into the fuse socket **10***a*. In this regard, it is also preferred to have the fuse body hollow through a major part of its length so that it can yield inwardly to allow for a snug fit of the fuse body in the fuse cavity so that there will be good contact between the fuse elements **10***a*, **10***c* and the wire contacts **16–17** and prong contact portions **14***d*, **15***d*. At the inner end of the fuse socket **10***a* it is preferred to provide a projecting portion **10***g* extending into the open end of the fuse body **12***a* to guarantee separation of the adjacent ends of the fuse elements **20***a*, **20***c*. The fuse elements **20***a–d* are formed from zinc or aluminum foil about 0.001 inches thick and are secured by a suitable adhesive to the fuse body. The exact thickness and width of the fuse elements of course depend upon the desired fuse rating.

It will be appreciated that the plug body **10** can be injection molded in one piece with the prong members **14–15** and contacts **16–17** and connected wires **18–19** in

place in the mold. The body of the fuse **12** can also be injection molded as one piece whereupon the fuse elements **10***a–d* are attached as by a suitable pressure sensitive adhesive. Hence the plug assembly need only have two plastic parts.

If one of the fuse elements **20***a*, **20***c* should sever because of an overload or short circuit, after the difficulty is corrected, the spare elements **20***b*, **20***c* can be placed in operation merely by removal of the fuse unit, turning it ninety degrees, and pushing it back into the fuse socket as before. To assist in removal of the fuse unit when desired, the portions **10***e'*, **10***f'* at the front edges of the sides **10***e*, **10***f* of the plug body can be beveled to expose the underside of the overlying portions of the enlarged head **12***b* of the fuse body.

I claim:

1. A fused plug assembly comprising:

a plug body formed with a pair of parallel spaced elongated prong sockets open to one end of the plug body and a central elongated fuse socket having a mouth open to the opposite end of the plug body,

a pair of parallel spaced prong members projecting as prongs from said opposite end of the plug body in alignment with said prong sockets, said prong members each having two legs within the plug body, one leg being exposed to a respective of said prong sockets and the second leg being exposed by a contact portion to the fuse socket,

a pair of wire leads extending from the plug body between the ends of the latter and having a pair of spaced wire contacts connected thereto, said wire contacts being exposed to said fuse socket in general alignment with and spaced from respective of said contact portions, and

a push-in fuse unit having a fuse body generally square in cross-section slidably received in the fuse socket with its head located between said prongs, said unit having a pair of spaced elongated fuse elements on opposite sides of said fuse body each arranged to engage a said contact portion and respective wire contact, and having spare fuse elements on the sides thereof between said opposite sides of the fuse body.

2. A fused plug assembly according to claim **1** in which said fuse body is hollow through part of its length.

3. A fused plug assembly comprising,

a plug body formed with a fuse socket having a mouth at one end of the body, said fuse socket having two pairs of opposite sides, two respective spaced electrical contacts on each side of one of said pairs,

a push-in fuse unit having a fuse body slidably mounted in said fuse socket and generally conforming to the shape thereof, said unit having respective fuse elements along each of its sides arranged to provide two fuse elements engaging the contacts at opposing sides of the fuse socket and to provide two spare fuse elements therebetween,

a pair of prongs projecting from the plug body at opposite sides of said mouth and connected to two of said contacts,

and conductor means connected to the other two contacts.

4. A fused plug assembly according to claim **3** in which the plug body is recessed around the mouth of the fuse socket and the fuse body has an enlarged head in the recess exposed at its sides between said prongs for being gripped for removal of the fuse unit from the fuse socket.

5. A fused plug assembly according to claim **4** in which said fuse body and its enlarged head are generally square and the enlarged head engages opposed faces of the prongs.

6. A fused plug assembly according to claim **3** in which the fuse body is hollow through a major part of its length for flexibility.

7. A fused plug assembly comprising:

a plug body formed with a central fuse socket having an exposed mouth,

a pair of coplanar, spaced prong members projecting as prongs from one end of the plug body, said prong members each being exposed by a contact portion to the fuse socket,

a pair of wire leads extending from the plug body and having a pair of spaced wire contacts exposed to said fuse socket in general alignment with and spaced from respective of said contact portions, and

push-in fuse means having a fuse body slidably received in the fuse socket, said—fuse means—having an active pair of spaced fuse elements mounted directly on said fuse body and each arranged to engage a said contact portion and respective wire contact, said fuse—means—also having a spare pair of fuse elements mounted directly on the fuse body and arranged to become active responsive to removal of the fuse unit from the fuse socket, changing the orientation of the fuse—means—relative to the socket to a reoriented position in which said spare fuse elements occupy the position previously occupied by said active fuse elements, and then reinserting the reoriented fuse—means—.

8. A fused plug assembly according to claim **7**, in which said fuse body is generally square in cross-section and said active fuse elements are on one pair of opposite sides of said square and the spare fuse elements are on the other pair of opposite sides of said square.

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